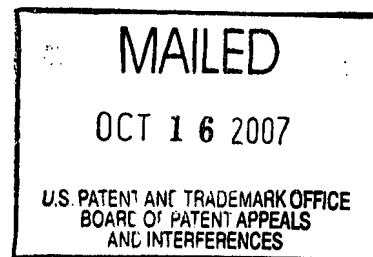


1 RECORD OF ORAL HEARING  
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3 UNITED STATES PATENT AND TRADEMARK OFFICE  
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6 BEFORE THE BOARD OF PATENT APPEALS  
7 AND INTERFERENCES  
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10 *Ex parte* A-JUNG KIM  
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13 Appeal 2007-2437  
14 Application 09/816,080  
15 Technology Center 2100  
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18 Oral Hearing Held: September 11, 2007  
19  
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22 Before JOSEPH L. DIXON, ROBERT E. NAPPI, and  
23 JOHN A. JEFFERY, *Administrative Patent Judges*.  
24

25 ON BEHALF OF THE APPELLANT:  
26

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32  
33 JUDGE DIXON: Good morning, counsel. You have twenty minutes  
34 for your presentation.

35 MR. WIELAND: I appreciate the time. Okay. I -- every time I've  
36 been to the Board, the Board has been -- as I am, so I'm going to dispense  
37 with any discussion about the background or anything and launch right into

1 the arguments, if that's okay. Naturally, you can ask any questions and I'll  
2 stop and go back. What we have is a cryptographic system, and I'm going to  
3 use the nomenclature used in cryptography of Alice being the sender, Bob  
4 being the receiver and Eve being the eavesdropper. This is actually in the  
5 patent. It's actually common, but it's in the Meyers (phonetic sp.) patent. In  
6 that system, what we have is Alice sends out a key. Now a key is just what  
7 you would think it is. It's a key to decryption, but it can't be intercepted  
8 because if the key is intercepted, it's a major problem. You don't have the  
9 security you want. So Alice sends, starts sending out this key, and is  
10 11001000111. Bob, on the other hand, is receiving these binary values. But  
11 it's a noisy environment. For double E's, we always try to suppress noise.  
12 We try to treat it. We try to do a lot of different things like clean up the  
13 signal, filter out the noise, amplify what you get, even interpolate and  
14 extrapolate the values so that you can clean up the values that you get. This  
15 invention actually turns that around. It actually has the insiders saying,  
16 noise is our friend, we can use noise very effectively here, because what we  
17 hear at Bob's site, is the signal's coming in, but he's not getting them very  
18 clearly. There's noise, there's background. There always is because it's a  
19 multiple access system. So he's getting this noise in and he's setting a  
20 threshold. And the ones that are above the threshold he's recording. Now  
21 what's neat about this is Eve sitting on side. She's sitting in a geographic --  
22 or not geographically -- a different location in the communications system.  
23 She has a different detector. She has different electronics. She has a  
24 different physical layer because she's not sitting there with Bob with his  
25 equipment. So she's hearing different noise because she's getting different  
26 signal levels. And she doesn't know what threshold Bob has set his listening  
27 device to, his, his receiver. So, what happens is Bob has this set of values

1 from this long string of potential key values and Eve has a different set of  
2 values because she couldn't hear at all. In fact, Eve may be clever and she  
3 may hear certain values and retransmit them bumped up. So you know, so  
4 that Bob's more likely to hear them. But Bob could detect the error rate  
5 that's created because she's not hearing these things exactly. So when  
6 sometimes she makes a decision, she makes a bad decision as to whether it's  
7 binary one or binary zero and sends off the wrong information. So he gets  
8 an increased error rate and he can detect the presence of Eve. Now when  
9 Bob gets these values, he then goes back to Alice and says, Alice, I heard 1-  
10 3-7-12-15-23. Those are the values that I got. Then told Alice what the  
11 values are. Now, Eve, on the side, doesn't know this. So, out of this values,  
12 because Eve's sitting there saying, I heard 1-2-3-4-8, whatever the difference  
13 is, and she doesn't know how he was doing it, so they end up with different  
14 values. Eve cannot eavesdrop meaningfully and understand what the key  
15 value being conveyed to Bob is, because Bob is actually the judge of what  
16 key value he's going to use, and then conveys back certain information to  
17 Alice, who knows what she transmitted and is able to deduce what key Bob  
18 will be using and they start the cryptography. Noise is this application's  
19 friend. Now once you understand that that's the impetus of it, the noisy  
20 background, you see that the system doesn't depend on noise. It just has a  
21 very creative way of going about distributing the key, the cryptographic key.  
22 Now the Meyers patent -- we're in the anticipation world, there's only one,  
23 one rejection, one patent and it's anticipation -- is actually pretty much the  
24 polar opposite of what we're doing here. What Meyers is saying is it is a  
25 quantum cryptographic system, meaning that you're transmitting photons or  
26 electrons, depending on their spin, but it is a quantum effect. Now the one  
27 thing that is notable about quantum effects is they are binary in nature. They

1 either are present or they are not. There are not half values in quantum  
2 physics. Either the spin is this way or it's that way. Either the polarization is  
3 this way or it's not. It is a binary effect. So what happens in the Meyers  
4 patent is Alice sends out -- actually, I have to go through the background  
5 because it's easier to understand, then I'll, I'll talk about it, what Meyers  
6 innovation is. In the background system what you have in a cryptographic,  
7 quantum cryptographic system is single photons go out and they're detected.  
8 And there's basically four polarization states of these photons. Turns out the  
9 detectors are a little bit less than dynamic or a, a, a have a relatively narrow  
10 thing. They could only detect whether the polarization is orthogonal or they  
11 could detect whether it's at 45 degrees, what is called plus and x detectors.  
12 They can't do both for whatever reason. And it's not really explained in the  
13 Meyers patent. So what they basically set up is a situation where Alice  
14 sends out these photons and Bob is receiving them, chooses, randomly  
15 chooses which detector he's going to use. And either he detects something  
16 and he knows he chose the right detector for that particular instance, or he  
17 gets garbage, he gets nothing out of it. But then he conveys back to Alice  
18 the base, what they call base in this patent, meaning which detector they use.  
19 He didn't say what he saw, whether it's plus or minus in these polarization  
20 things, but he says, use x. Use plus. And that goes back to Alice, and Alice  
21 is able to establish the key. The problem with that system then is in the  
22 Meyers patent again, is that it requires an absolute perfect transmission.  
23 Noise will destroy it. And it says that very clearly. That's the problem that  
24 they're trying to address. The, the reason that quantum cryptographic  
25 systems are so marvelous is if Eve is in the middle and listens to it, because  
26 of the Heisenberg uncertainty principle, her listening to that photon,  
27 detecting what it is destroys the photon. Changes it's characteristic. And

1 that's the reason they can detect whether Eve is present, because the values  
2 that they are getting are unexpected. But the problem -- also in the  
3 background of the Meyers patent is that when these photons come out of the  
4 emitters, sometimes the emitters are a little bit loose and it's amidst two or  
5 three photons, or maybe many. And what'll happen is, Eve can put a beam  
6 splitter in there. One photon goes through. Quantum physics, you don't get  
7 half values. Either it goes through or it doesn't. But another photon would  
8 be reflected off to Eve. Eve detects it and she can detect the, the  
9 cryptographic key that's being distributed. So Meyers adds a level of  
10 complexity. They say, you know, rather than single photons, we're going to  
11 use this relation, this correlation between three photons, what they call GHC,  
12 after the name of the people that came up with this idea. So instead of one  
13 photon, they use three. Two of them stay with Alice, she detects what they  
14 are, knows what the bases are, sends a third one off to Bob. Bob gets the  
15 value. He knows what detector he uses is from those two bits of  
16 information. They then exchange the basis for the detection, not the values  
17 of what is measured. In fact, it's not values, it's a result of what's detect.  
18 Again, it's binary. It's either plus or minus. But it's not a value  
19 measurement. It's just an existence or a non-existence measurement. They  
20 exchange bases, they correlate this. They go through what is expected, and  
21 of those times, certain times they get the, the base is right. That is, the  
22 detectors are all correctly aligned and they can say, that was a good value  
23 and they keep that value. Now Eve, in the interim, doesn't know all this.  
24 She's watching it, she won't know what the GHR -- GHZR is, and  
25 presumably the detection of that single photon will be detected in the normal  
26 manner, as in the background section of the Meyers patent.

1 JUDGE JEFFERY: Counsel, let me, let me ask you a quick  
2 question --

3 MR. WIELAND: Sure.

4 JUDGE JEFFERY: -- here about this. That detection that is  
5 occurring, the photons. Is that measuring the decoded signal as plain? I  
6 mean, is there a dispute with respect to that --

7 MR. WIELAND: That is the focus.

8 JUDGE JEFFERY: -- limitation?

9 MR. WIELAND: It's at the end of the punch line, but that is --

10 JUDGE JEFFERY: As I understand, yeah, one of the key points of  
11 this dispute is a threshold value.

12 MR. WIELAND: Right.

13 JUDGE JEFFERY: Or lack thereof --

14 MR. WIELAND: Correct.

15 JUDGE JEFFERY: -- here. And that I understand your position that  
16 this detection of the signal and it's correspondence to one of the four bases is  
17 not having the measured value beyond a threshold value, which is  
18 predetermined and it's nearly a binary determination.

19 MR. WIELAND: You have it exactly. I don't need to be here.

20 JUDGE JEFFERY: But even -- well, I was going to say, but the  
21 concern that I have is, wouldn't even a binary determination involve some  
22 sort of comparison to a predetermined threshold to determine if it's one or  
23 the other?

24 MR. WIELAND: That's the, that is the magic here. In quantum  
25 physics that is not the case. The binary -- quantum means that there is a unit  
26 that is not dividable. The photon's there or it is not there. You can measure  
27 characteristics of it. And so what happens here is you have a detector, x or

1 plus detector, that will say this particular photon has this particular  
2 polarization. It's measuring a characteristic, but the -- there's no threshold  
3 because it is a binary state. It is either present or it is not present. And that's  
4 the, that's the key. You can't dial it in. You can't say, I got seven tenths of a  
5 photon. That doesn't exist. Is this -- there's no, there's no part values in  
6 quantum physics. That's the name of it. Quantum means there are no part  
7 values.

8 JUDGE JEFFERY: It's all or nothing --

9 MR. WIELAND: All or nothing.

10 JUDGE JEFFERY: -- and, but, but nothing and all, that to me  
11 involves some sort of predetermined determination whether it's all or  
12 nothing. I mean, it's an extreme comparison, if you will, but at the end of  
13 the day, it's -- you're, you're comparing what you get with a predetermined  
14 threshold.

15 MR. WIELAND: Right. And there's more to it, and you're focused  
16 on, you know, subparagraph C, where it says, bit by bit, base is having a  
17 measured value beyond a threshold value, which is predetermined. Then  
18 you have to look at E. Where the first and second users, I'm sorry. D -- I  
19 actually have a screwed up claim here, but it says D, it says, second user  
20 informing the first user of the bits adapted, or adopted, are the nth bits in the  
21 transmitted bit sequence, not telling the values of the bits. Now you see,  
22 again, values is about this measured seven tenths of what is expected for a  
23 binary one. And then you end it with paragraph E, which is taking the  
24 adopted bits as the key values and discarding the remaining ones. In the  
25 Meyers patent, what is exchanged is the basis, not the values. Now  
26 remember, in, in Meyers at the end, I mean, they can call nine, which is  
27 really the only relevant section. You have this thing where collate the basis,

1 the measuring techniques. They do not say what the values are and so that is  
2 a fundamental difference. I understand that, you know, when you read these  
3 claims, your just like, come on, is this a thresholding invention? But it's  
4 really very much more to that. There's a subtlety to the claims that takes  
5 some explaining, hence, why I'm here.

6 JUDGE DIXON: So you'd say that that rough sort of present or not  
7 present is not a threshold?

8 MR. WIELAND: No, I don't think it is, and not in the context of  
9 these claims. Not in the context of this invention.

10 JUDGE DIXON: Um-hum.

11 MR. WIELAND: And not, not in the meaning of quantum physics.  
12 There's no thresholding here. I, I thought --

13 JUDGE DIXON: Well, wasn't there, as Judge Jeffery was saying,  
14 present or not present, that's a threshold. You're over something.  
15 Infinitesimal, it's either not there, or how do you determine it's not there? By  
16 it is there, so you had to find that it was greater than nothing. So --

17 MR. WIELAND: You're saying the threshold is zero. It's either zero  
18 or it's not, but I don't know if you can -- I don't -- I think that's too far -- first,  
19 the phrase is threshold value. Value has meaning here. But I think --

20 JUDGE DIXON: Zero is value, isn't it?

21 MR. WIELAND: Well, threshold value means something more than  
22 zero or one.

23 JUDGE DIXON: It is?

24 MR. WIELAND: Yeah. I don't think you can -- I think just the plain  
25 meaning of the phrase tells you that. Threshold value suggests that it's not  
26 just binary zero, binary one. Meaning, if you're saying that, then basically  
27 what you're saying is then you're conveying the, the, the values back to the,



1 the -- well, let's go through this. If you're saying a binary one, let's say the  
2 spin state is x positive x. And what the, the being conveyed from Bob back  
3 to Alice is, I used the x detector. Okay? That threshold value isn't being  
4 used there. He's just saying, I used this as a base. So you have a disconnect  
5 between the measured values and what's actually conveyed. But more  
6 importantly, I really have a hard time saying threshold value which, you  
7 know, has to mean something other than binary states, because in quantum  
8 physics, you don't say, I got, I mean, I think you, you, you're confusing or  
9 you're suggesting that threshold -- and I didn't mean to just say confusing --  
10 you're suggesting that threshold and gate keeping are the same thing. And  
11 that's not the same thing. Threshold has to -- remember, the threshold  
12 should be set so I, I would say, you know, if you, if you had to go to this  
13 extent, you could say, go on back to the spec. I know that we're talking  
14 about something other than binary states. And the Examiner didn't even  
15 suggest that was the case. He said it was inherent that you're throwing out a  
16 threshold, and I don't think he was fully aware of the quantum nature or the  
17 implications of quantum aspects of this Meyers patent. Can I go on to claim  
18 two, or I'm glad to stay here and -- I think I'm out of time almost, so.

19 JUDGE DIXON: Continue. No. Continue.

20 MR. WIELAND: Claim two, I, you know, I don't actually think that  
21 there is much argument about. They both do a statistical analysis.  
22 Examiner, I would say, points to the wrong section of Meyers. If you're  
23 going to look at something, I would look at column nine, lines 29 through  
24 44. That is the over layer where you're now doing some form of statistical  
25 analysis on the error rate. Claim three, there was an attempt to, to define  
26 around quantum physics, but I'm not sure it gets us there. Claim four,  
27 mutual modulated noise by another transmitter. Meyers is pretty clear,

1 saying, that this has to be a fairly pure system. So it's not a multiple access  
2 system. And you're not going to have intermodulations, particularly since  
3 it's quantum physics, and that doesn't really happen. Claim five and six, I've  
4 read that section numerous times where he, he cites to it and I don't, I just  
5 don't see it. I, I, I'm not sure what he's getting at there. But in any event,  
6 they are dependent claims. But it just seems that he cited the wrong section  
7 for that.

8 JUDGE DIXON: But you didn't argue all those dependent claims  
9 separately?

10 MR. WIELAND: I did, actually. I -- the only one I didn't argue  
11 separately was claim three. And that -- I just couldn't put a polish on that.

12 JUDGE DIXON: Claim three?

13 JUDGE JEFFERY: Page eight.

14 MR. WIELAND: You know, there's a sense of this, and I think my  
15 sense of it is this isn't so much about the two disclosures being the same, that  
16 they're disclosing the same invention. It's more about a labor of claim  
17 language. And they -- we, we submit to the claims actually capture our  
18 invention and are not so broad as to capture the Meyers type system.

19 JUDGE JEFFERY: Okay.

20 MR. WIELAND: Gentleman, I thank you for your time. If there's  
21 any -- oh, sorry.

22 JUDGE DIXON: There's one more question. Going back to claim  
23 one in, in subparagraph D, where we call for the second user informing the  
24 first of the -- in defense of the sequence, so we have to identify exactly  
25 where -- I just want to make sure clarify that point, that it has to be a  
26 particular point in the sequence that must be informed. The user has to  
27 inform the other about.

1 MR. WIELAND: Yes.

2 JUDGE JEFFERY: Okay.

3 MR. WIELAND: I, you know, if this, if this was my application, I  
4 would write the claims differently, too, but that is the meaning of that  
5 phrase, and, and we haven't had a problem with the examiner in that regard.

6 JUDGE DIXON: All right.

7 JUDGE JEFFERY: Okay. Thank you. Any questions?

8 UNIDENTIFIED SPEAKER: May I have Ms. Sculia (phonetic sp.)  
9 first and last name, please?

10 MR. WIELAND: I'll just give you a card. It is -- if there's nothing  
11 else, gentlemen, I thank you for your time. Been fun.

12 JUDGE JEFFERY: Thank you.

13 (Whereupon, the proceedings concluded.)

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